

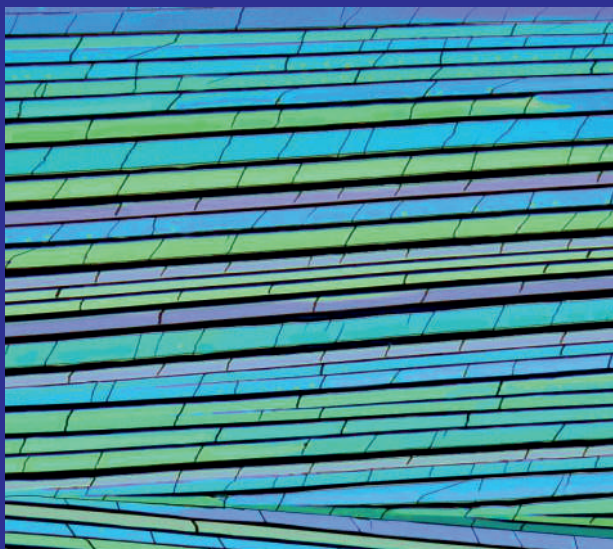
Pedagogie și Didactică

ASSESSMENT TASKS IN CHEMISTRY

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Editor și coordonator:
Roxana S. Timofte

Presa Universitară Clujeană



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ROXANA S. TIMOFTE

(EDITOR ȘI COORDONATOR)

Colecția *Pedagogie și Didactică*
este coordonată de Roxana S. Timofte și Liliana Măță.

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Preface

Assessment plays an important role in education and the teachers and academics should be aware of the different strategies used for the development of assessment tasks. Herein are presented assessment tasks developed by using different strategies: by using a competency model and by using a learning taxonomy.

In Part I are presented items on the following topics in Chemistry: *fundamentals of chemical reactions, acid-base reactions, organic reactions and reactions used for analysis*, which could be used to assess Chemistry competencies of High School students. The items were developed by using the ESNaS tridimensional competency model developed in Germany.¹ The dimensions are: area of competence, cognitive processes and complexity. The areas of competence are: use of content knowledge, acquirement of knowledge, communication, evaluation and judgment. The cognitive processes which could be involved when solving a task are: reproduction, selection, organisation, integration. The complexity refers to the structure of information used in the task and this could be: 1 fact, 2 facts, 1 relation, 2 relations, overarching concepts. The items presented herein are developed in the area of competence use of content knowledge. The envisaged complexity level and the cognitive level are presented for each item. The items were incorporated in a larger instrument regarding the assessment of Chemistry competence and the instrument was tested on High School students in Germany. Psychometric analysis of data showed that the instrument exhibits good psychometric properties and that it is unidimensional.²

¹ Kremer, K., Fischer, H. E., Kauertz, A., Mayer, J., Sumfleth, E., & Walpuski, M. (2012). Assessment of standards-based learning outcomes in science education: Perspectives from the German project ESNaS. In S. Bernholt, K. Neumann, & P. Nentwig (Eds.), *Making it tangible. Learning outcomes in science education*, pp. 201-218. Münster, New York: Waxmann.

² Timofte, R., Sumfleth, E., Walpuski, M. (2019, May). *Analysis of competence structure in the area of competence use of content knowledge in chemistry*. Presented at the conference *Didactics: past, present and future perspectives*, Alba-Iulia, Romania.

instrument exhibits good psychometric properties and that it is unidimensional.²

In Part II are presented items developed by using the Marzano taxonomy of learning. Utilisation of learning taxonomies for developing learning objectives and assessment tasks is pivotal in education. The levels for the cognitive domain in the Marzano & Kendall learning taxonomy (2007)^{3,4} are: retrieval, comprehension, analysis, knowledge utilization. The associated mental processes are presented in the table underneath:

Table: Different levels of difficulty for cognitive domain in Marzano and Kendall learning taxonomy (2007)

Level	Mental process
Knowledge utilisation	Decision-making, Problem-Solving, Experimenting, Investigating
Analysis	Matching, Classifying, Analysing, Generalising, Specifying
Comprehension	Integrating, Symbolising
Retrieval	Recognizing, Recalling, Executing

The items developed on the topic *Physical Bonding* were tested on Chemistry university students from Romania (Timofte & Siminiciuc,

² Timofte, R., Sumfleth, E., Walpuski, M. (2019, May). *Analysis of competence structure in the area of competence use of content knowledge in chemistry*. Presented at the conference *Didactics: past, present and future perspectives*, Alba-Iulia, Romania.

³ Marzano, R. J., & Kendall, J. S. (2007) *The new taxonomy of educational objectives* (2nd ed.), CA: Sage, Thousand Oaks.

⁴ Irvine, J. (2017). A comparison of revised Bloom and Marzano's New Taxonomy of Learning, *Research in Higher Education*, 33, 1-16.

2018).⁵ The statistical analysis showed that the instrument exhibited satisfactory psychometric properties. The items which did not fit to the instrument are not presented in this book.

Roxana S. Timofte

⁵ Timofte, R. S.; & Siminiciuc, L. (2018). Utilisation of Rasch model for the analysis of an instrument developed by mapping items to cognitive levels of Marzano taxonomy. *Acta Didactica Napocensia*, 11(2), 71-78.



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